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10/578,265

07/03/2006

Shahab Jahromi

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EXAMINER

RAYMOND, BRITTANY L

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

04/04/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|---------------------------------------|--|
| Office Action Summary | Application No. 10/578,265 | Applicant(s) JAHROMI ET AL. | |
| | Examiner BRITTANY RAYMOND | Art Unit 1795 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 5/4/2006; 7/3/2006; 11/6/2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-8,11-13,16 and 18-48 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-8,11-13,16 and 18-48 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 May 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>7/26/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 6-8, 11 and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The language in claim 6 is confusing and should be changed to "wherein the insoluble additive comprises nano particles," as in claim 36 of the present invention.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 3, 4, 13, 16 and 43 are rejected under 35 U.S.C. 102(b) as being anticipated by Taketo (JP Publication 10-340846).

Taketo discloses an immersion lithography process and exposure apparatus comprising: a refractive index adjusting device that increases the amount of an additive that is provided in the immersion liquid in order to increase the refractive index to that of the additive, and a recycling system that is used to recycle the immersion liquid used in the exposure process (Paragraphs 0026-0032), as recited in claims 1, 3, 13, 16 and 43 of the present invention. Since the amount of additive is being monitored, it would be

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apparent that the amount of additive present can either be very small or large, as recited in claim 4 of the present invention. Taketo also discloses that a 193 nm exposing light can be used (Paragraph 0020), as recited in claim 1 of the present invention.

Taketo teaches every limitation of claims 1, 3, 4, 13, 16 and 43 of the present invention and thus anticipates the claims.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 5-8, 11, 12 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taketo (JP Publication 10-340846) in view of Chen (U.S. Patent Publication 2004/0152011).

The teachings of Taketo have been discussed in paragraph 4 above.

Taketo fails to disclose that the additive is insoluble in the immersion fluid and comprises nano particles, that the nano particles have an average size that is 10 times smaller than the wavelength of exposure light, that the nano particles have an average size of less than 100 nm, and that the nano particles comprise an aluminum ion, silicon dioxide, magnesium dioxide, or aluminum dioxide.

Chen discloses a photoresist exposure process comprising: immersing nano particles into a polymer matrix to form a contrast enhancement layer, spreading the contrast enhancement layer over a photoresist covered substrate, and exposing the substrate in order to bleach the contrast enhancement layer and pattern the photoresist (Paragraph 0047), as recited in claims 5, 6 and 46 of the present invention. Chen also discloses that the nano particles can be magnesium dioxide, aluminum dioxide, or silicon dioxide (Paragraph 0046), as recited in claims 11 and 12 of the present invention. Chen states that nano particles have a diameter in the range of 1 nm to 100 nm (Paragraph 0013), as recited in claims 7 and 8 of the present invention.

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to have used the nano particles of Chen, as the additives of Taketo because Chen teaches that these nano particles increase the resolution of the exposure process and create a finer and more accurate photoresist pattern.

7. Claims 18, 19, 30-34, 44 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taketo (JP Publication 10-340846) in view of Kunz (U.S. Patent Publication 2005/0164522).

The teachings of Taketo have been discussed in paragraph 4 above. Taketo teaches every limitation of dependent claims 31, 33 and 34 of the present invention.

Taketo fails to disclose that the immersion fluid is alkane, and that the alkane comprises 6 to 10 carbon atoms

Kunz discloses fluids to be used in immersion lithography processes comprising alkanes with 1 to 20 carbon atoms (Paragraphs 0050 and 0099).

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to have used the immersion fluids of Kunz in the process of Taketo because Kunz teaches that these fluids allow for increased resolution during exposure of the photoresist.

8. Claims 20-29, 35-42, 47 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taketo (JP Publication 10-340846) in view of Chen (U.S. Patent Publication 2004/0152011) and Kunz (U.S. Patent Publication 2005.0164522).

The teachings of Taketo have been discussed in paragraph 4 above. Taketo teaches every limitation of dependent claims 22, 27-29, 37 and 42 of the present invention.

Taketo fails to disclose that the additive is insoluble in the immersion fluid and comprises nano particles, that the nano particles have an average size that is 10 times smaller than the wavelength of exposure light, that the nano particles have an average size of less than 100 nm, that the nano particles comprise an aluminum ion, silicon dioxide, magnesium dioxide, or aluminum dioxide, that the immersion fluid is alkane, and that the alkane comprises 6 to 10 carbon atoms.

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Chen teaches in paragraph 6 above different types of nano particles that can be included in a layer above a photoresist during exposure of the photoresist, as recited in claims 20, 23-26, 35, 36, 38-41 and 47 of the present invention.

Kunz teaches in paragraph 7 above fluids to be used in immersion lithography processes comprising alkanes with 1 to 20 carbon atoms, as recited in claims 20, 21, 47 and 48 of the present invention.

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to have used the nano particles of Chen and fluids of Kunz in the process of Taketo because Chen and Kunz teaches that these compositions increase the resolution of the exposure process and create a finer and more accurate photoresist pattern.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRITTANY RAYMOND whose telephone number is (571)272-6545. The examiner can normally be reached on Monday through Friday, 8:30 a.m. - 5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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**/Mark F. Huff/
Supervisory Patent Examiner, Art Unit 1795**